[COMMITTEE PRINT]

THE INFORMATION SCIENCE AND TECHNOLOGY ACT OF 1981

REPORT

PREPARED BY THE

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FOR THE

SUBCOMMITTEE ON

SCIENCE, RESEARCH AND TECHNOLOGY

TRANSMITTED TO THE

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

NINETY-SEVENTH CONGRESS

SECOND SESSION

Serial DD

JUNE 1982

Printed for the use of the Committee on Science and Technology

U.S. GOVERNMENT PRINTING OFFICE

95-303 O WASHINGTON : 1982

H702-18

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*On assignment to Budget Committee for 97th Congress.

LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C., June 11, 1982.

Hon. DON FUQUA,
Chairman, Committee on Science and Technology, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am transmitting herewith a report, "The Information Science and Technology Act", prepared by the Congressional Research Service at the request of the Subcommittee on Science, Research and Technology. The report analyzes the Subcommittee's hearings on H.R. 3137, the Information Science and Technology Act of 1981, which were held on May 27 and 28, and June 9, 1981. Included with the report are conclusions and recommendations of the Subcommittee on Science, Research and Technology which have been approved by Members of the Subcommittee.

Information and communications technologies are in a rapid stage of development; this development will be a dominant feature of the next decade. Ensuring the efficient and humane use of this technology raises many complex public policy issues. The Subcommittee believes that this report provides a useful analysis of the need to establish effective mechanisms for government-private sector cooperation which is essential for maintaining United States leadership in world information markets and for maximizing the potential benefits of microelectronics and communications technologies. I commend this report to your attention and to the attention of the Members of the Committee on Science and Technology.

Sincerely,

DOUG WALGREN,
Chairman, Subcommittee on Science, Research and Technology.

LETTER OF SUBMITTAL

CONGRESSIONAL RESEARCH SERVICE,
THE LIBRARY OF CONGRESS,
Washington, D.C., March 17, 1982.

Hon. Doug Walgren,
Subcommittee on Science, Research, and Technology, Committee on Science and Technology, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am pleased to submit this report entitled *Analysis of Hearings on H.R. 3137: The Information Science and Technology Act* prepared at the request of the Subcommittee of Science, Research and Technology.

This report provides an analysis of the major issues discussed at the subcommittee's hearings on H.R. 3137 and outlines the various alternatives for action proposed by the witnesses. Included in the introduction is a summary of the bill and hearing schedule. This is followed by an overview of the impact of information technology on society, a descripton of the U.S. Government framework for information policy, identification of major information policy issues, discussion of the provisions of H.R. 3137, and various alternative courses of action.

The report was prepared by Jane Bortnick, Specialist in Information Science and Technology, Science Policy Research Division.

We hope that this report will serve the needs of your committee and appreciate the opportunity to perform this challenging assignment.

Sincerely,

GILBERT GUDE, *Director*

LETTER OF REQUEST

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C., August 12, 1981

Hon. GILBERT GUDE,
Director, Congressional Research Service, Library of Congress, Washington, D.C.

DEAR GIL: As you know, the Subcommittee on Science, Research and Technology has, over the past several years, pursued the development and application of communications and information technologies, and the importance of information technology to our national well-being. The Congressional Research Service staff has made a valuable contribution to the activities of the Subcommittee.

At this time, we would again like to request the services of the Congressional Research Service staff to prepare an analysis of the Subcommittee's hearings on H.R. 3137, the Information Science and Technology Act. We would appreciate it if the analysis could be developed under the guidance of Ms. Jane Bortnick. If feasible, we would like the analysis to include: an executive summary, introduction, analysis of the components of the bill and associated responses of the witnesses, and suggested options for addressing the concerns encompassed in the bill and the issues raised during the hearing.

We sincerely appreciate the assistance and expertise of your staff in helping the Subcommittee examine the role of Congress and the Federal Government in nurturing and managing our information resources.

Sincerely,

DOUG WALGREN,
Chairman, Subcommittee on Science, Research and Technology.

CONTENTS

	Page
Letter of transmittal	III
Letter of submittal	V
Letter of request	VII
Conclusions and Recommendations of the Subcommittee on Science, Research and Technology	1
Analysis of Hearings on H.R. 3137, The Information Science and Technology Act	7
I. Introduction	7
Overview	7
Background	8
Summary of H.R. 3137	8
Hearings	10
II. The Information Society	13
Technological Advances	13
The Role of Information in the Economy	14
Information Policies of Foreign Governments	17
III. U.S. Government Framework for Information Policy	19
Nature of Information Policy	19
Key Players in Federal Information Technology	21
IV. Major Information Policy Issues	25
International Issues	25
Coordination and Dissemination of Scientific and Technical Information	26
Public and Private Sector Interaction	27
V. H.R 3137: Pros and Cons	31
Concept of an Institute for Information Policy and Research	31
Need for New Institutional Arrangements for Information Policymaking	31
Support for Existing Institutional Arrangements	33
VI. Alternatives for Action	35
Improve Existing Structure	35
Establishment of an Institute	36
Alternative Proposals	36
Appendix -- H.R. 3137, The Information Science and Technology Act of 1981	39

95-303 O—82——2

CONCLUSIONS AND RECOMMENDATIONS OF THE SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

INTRODUCTION

American society is now well advanced into the "Information Age." The United States is continuing a rapid transition from an economy based on industrial production to one based increasingly on information products and services. Information and the ability to access it quickly and reliably is becoming a vital source of political and economic power. The products of microelectronics technology now permeate virtually every aspect of commercial and industrial activity, and the importance of microelectronics is manifest not only in the dollar value of information products and services themselves, but also in the central role played by information technology in increasing productivity and promoting innovation in other sectors of industry and commerce.

Important as these economic consequences are, the impact of the Information Revolution will also be felt in many ways that are difficult to measure in dollars and cents. Decisions about development and applications of information technology will have a major influence on the pattern and quality of American life for many years to come. The strategy pursued will have profound implications for national security; for the size and structure of the work force and the quality of the work experience; for the evolution of our educational institutions; for personal privacy and civil liberties; and for many other concerns central to our personal and societal values.

The Information Revolution is rooted largely in American scientific and technological leadership, but foreign governments have been quick to recognize the economic and social challenges posed by the transition to the information age. A number of our major trading partners have responded with active programs designed not only to enhance their competitive positions in international trade, but also to train their citizens in the effective use of information technology. These countries regard a strong internationally competitive position in information products and services as a major pillar of future economic prosperity, and some of them have set clear goals of overtaking the United States in particular information markets. The stakes are high in this information game, and we ignore at our peril the importance which our competitors now ascribe to their information industries and to the development of widespread computer literacy in their societies.

UNITED STATES RESPONSE TO THE INFORMATION REVOLUTION

From the testimony received on H.R. 3137 and on the broader issues prompting its introduction, it is clear that the Federal Government is having a difficult time developing a coherent strategic

view of how our transition to an information society should take place. A consensus on the proper scope of "national information policy" does not yet exist in this country. The important contribution of commercial and not-for-profit enterprises, combined with the Government's inclination to defer to the marketplace in information activities, requires a unique approach to policy development in the United States. The interaction between the Federal Government and private interests is complex and the boundaries often fuzzy. And within the Federal Government itself, numerous agencies are involved in the many aspects of information, from support of R&D to policy research and analysis to dissemination of information products.

The Federal Government is a major actor in information affairs. It is the largest participant in the information marketplace; the regulator of the information marketplace; and a major source of research and development support. The many diverse Federal activities in the information arena require different perspectives and expertise of the various agencies involved, and it is not feasible to have a single locus of authority for all information concerns. However, there appear to be at least three major problems in the present decentralized approach to information issues:

1. Lack of coordination among agencies charged with information responsibilities and between the public and private sectors;

2. Inadequate attention at high levels to the broad changes in many economic, technical and social sectors which may be triggered by information technology; and

3. Lack of investment of human or financial resources to insure that our Nation makes best use of new technological developments both domestically and in our competitive trade position.

Coordination

Responsibility for Federal research, development, and policy activities concerned with information is widely dispersed throughout the Executive Branch, and there appears to be no adequate mechanism for developing and promoting an integrated approach. This inadequacy is most obvious in the areas of international information policymaking; scientific and technical information (STI); and the general question of public and private sector interaction.

In the international arena, it is often difficult to tell who speaks for the United States on information policy matters. In view of the sharply increased competitiveness of international information markets, it is imperative that our positions be made known as clearly as possible, both to foreign governments and to United States firms operating abroad.

Regarding scientific and technical information (STI), a series of Government and private sector reports going back nearly 25 years have pointed out the lack of coordination among agencies in gathering and disseminating STI, resulting in duplication of effort in some cases and inaccessibility of information already collected in others. The efforts made to date by the Office of Science and Technology Policy (OSTP) have not overcome these problems. There is also a rapidly developing problem regarding the dissemination abroad of scientific and technical information deemed sensitive for economic or national security reasons. A potentially serious conflict

between the scientific tradition of freedom of information and the secrecy demands of the defense and intelligence communities is in urgent need of attention.

Public and private interaction is of great importance to future progress in the development of comprehensive information policy. There is general agreement that Federal support of research and development in high-capital, high-risk areas of information technology is a necessary and proper role of Government. However, considerable disagreement remains concerning the appropriate Government role in the collection and dissemination of information. The private sector wants a clearer determination of the rules for the information marketplace, but at the same time the Federal Government must continue its refereeing function and its role in promoting equity in access to information. To guide the development and coordination of information policy, a systematic and on-going mechanism is needed to establish an identifiable public/private forum for integrating concerns about the development of information and communications technology with the economic, social, and political concerns associated with the application of this technology.

In each of these areas what appears to be lacking is a systematic approach to information technology and its uses which could assemble and focus the collective insights of different agencies and the private sector, and plug them into the policymaking process. It is particularly difficult to provide objective analyses of long-range concerns under the present institutional and bureaucratic constraints within which agencies deal with their various portions of information policy. In the absence of a strong coordinating mechanism, important decisions with great potential impact are sometimes made with little or no involvement of groups with relevant expertise. For example, the recent landmark settlements made by the Justice Department with AT&T and with IBM were made with virtually no contribution from the Federai information and telecommunications policymaking apparatus.

High-Level Attention to Information Concerns

Information is part of the life blood of any institution or organization. There is a strong tendency to take information and the tools used to process it for granted, and to think of them as ancillary to the real business at hand. Nowhere is this more apparent than at the high levels of the United States Government, where officials, beset with performance demands and operating with diminishing resources, have generally not accorded a high priority to information issues.

The National Telecommunications and Information Administration of the Department of Commerce, which is charged with providing policy advice to the President on information and telecommunications issues, has a relatively low profile within the Commerce Department and a shrinking budget. Attention to information issues in the Executive Office of the President, in this and the previous Administrations, have been sporadic and ad hoc. Although the Office of Management and Budget (OMB) is taking on an increased role in information management since the passage of the Paperwork Reduction Act of 1980, OSTP has not taken a strong

leadership role in discharging its information responsibilities under the National Science and Technology Policy, Organization, and Priorities Act of 1976.

The United States is probably unique among developed nations in not having any clearly designated Cabinet-level official with primary responsibility for information and communications issues. Given this situation, it is essential that leadership in information issues be forthcoming from the agencies and individuals with statutory or designated responsibilities in these areas. The Congress should make clear to high-level officials with these responsibilities that it regards the development and application of information technology as an issue deserving high priority.

Resource Levels

Although the Subcommittee acknowledges the need for budget stringency, it has serious concern about underinvestment in precisely those areas which have most promise of yielding great future economic returns. Information products and services represent one of the fastest growing areas of the United States economy, and our future economic success and national security depend heavily on the continuing development and application of new microelectronic technology. The long-term consequences of deep budget cuts in this area, including in particular the loss to key Government agencies of highly skilled policy professionals, will be to weaken our ability to adapt and use the fruits of the Information Revolution.

The FY 1983 budget proposals regarding information science and technology reflect the following: substantial reduction of staff and funding for the National Telecommunications and Information Administration (NTIA), the agency charged with principal information policy-related activities, and for the Federal Communications Commission (FCC); cuts in funding for the Institute for Computer Sciences and Technology of the National Bureau of Standards (NBS), which has responsibility for data processing standards, and its transfer to the General Services Administration (GSA); reduction of funding for United States participation in international information forums; lower levels of funding for information science and technology research by the National Science Foundation (NSF); termination of the National Commission on Libraries and Information Science (NCLIS); and reductions in information dissemination activities. Taken together, these reduced resource levels raise questions about the ability of the Federal Government to carry out its role in facilitating and adopting to the transition to an information society. Modest resources, judiciously disbursed, could make the difference between a posture of effectively catalyzing and smoothing a dynamically positive technological transition, or being locked in to a technologically obsolete set of institutional arrangements and strategies.

Summary

Information and communications technologies are still in a rapid stage of development, and this development will be a dominant feature of the next decade. Ensuring the efficient and humane use of this technology raises many difficult public policy issues. Existing

mechanisms appear to be incapable of generating and sustaining the kind of government-private sector cooperation that is essential to maintain United States leadership in world information markets and to maximize the potential benefits of microelectronics and communications technologies. The Subcommittee believes that rapid improvements are needed.

RECOMMENDATIONS

Information policy issues range broadly over many distinct concerns, but virtually all these issues have been profoundly influenced by the advances of the last two decades in microelectronics and telecommunications technology. The Subcommittee believes that Federal policymaking would be strengthened by a more systematic and integrated approach to the development and applications of this technology. A key step in this strengthening is the establishment of a recognized and ongoing mechanism for the interaction of public and private interests in developing and refining policy options.

In addition to the particular recommendations listed here, the Subcommittee wishes to give strong encouragement to the efforts of business and commercial interests, trade associations, educational instructions, libraries, and other groups active in the information arena, in organizing to plan for best use and adaptation to the new technology.

Institutional Focus

The Subcommittee recommends the establishment, in the Executive Office of the President, of an interdisciplinary Task Force on Information Science and Technology, to be chaired by the Director of OSTP and to include the participation of the Associate Administrator of OMB for Information and Regulatory Affairs. The Task Force would coordinate the activities of Executive Branch agencies having significant responsibilities for research, development, and application of information technology. It would be responsible for high level policy development on information issues, and would draw on the research capabilities of the Federal Government, private interests, and academia.

Advisory Board

The Subcommittee recommends the establishment of a high-level Advisory Board to the Task Force, composed of experts drawn from both public and private sectors and representing the variety of different functions involved in information processing and transfer. The Advisory Board would function under a congressional charter for five years, after which time the charter could be renewed at the determination of the Congress.

The Advisory Board would provide technical and policy advice to the Task Force on Information Science and Technology on information issues of immediate concern as well as potential long-range impacts. The Advisory Board should act as an interface between Federal Government planning and policy formation, and private sector activities. It should encourage and recommend methods to facilitate private sector planning for use and adaptation to new informa-

tion technology. Information users, providers, and technology producers should be encouraged to form appropriate industry-wide groups to develop solutions to generic institutional and policy problems, and communicate these to the public and private sectors as a basis for effective strategy development.

Scientific and Technical Information

The Subcommittee recommends that the Office of Science and Technology Policy work with OMB to take immediate steps to improve the dissemination of scientific and technical information generated by the Federal Government, including: better coordination of STI activities among agencies and the elimination of institutional barriers to improve STI flows; integration of data bases and elimination of unnecessary duplication through increased networking capabilities; and an appropriate blending of private sector capabilities with Federal efforts.

The Subcommittee further recommends that OSTP give serious consideration to reconstituting an active, permanent interagency committee to deal with STI issues.

ANALYSIS OF HEARINGS ON H.R. 3137, THE INFORMATION SCIENCE AND TECHNOLOGY ACT

I. INTRODUCTION

A. OVERVIEW

Advancements in data processing and telecommunications technologies, and in particular their combined capabilities, create new opportunities for efficient transfer of information on a global basis. They also make possible a proliferation of new information products and services and provide improved support for decisionmakers in both Government and the private sector. As the economy becomes more service oriented, there is a concommitant increase in the reliance on information and the value attached to it.

The role of information in the economy is difficult to quantify in precise terms, but current indicators point to a substantial growth curve for the wide array of goods and services which may be termed the "information industry." At the same time, modern information technologies are transforming the way people do business (for example through electronic funds transfers) and are providing new types of home entertainment and educational opportunities. This phenomenon is most advanced in the United States, but it has worldwide implications. In addition, countries such as Japan, Canada, and several Western European nations are beginning to challenge U.S. preeminance in a number of fields and are focusing much attention on information policies.

In contrast, the responsibility for addressing information issues in the United States is diffused throughout several agencies of the Federal Government. Moreover, the private sector plays a major role in both supporting developments in information technology and determining future directions in information policy. This decentralized approach which is inherent in the American system of Government and free enterprise is credited both as the underpinning of the dominant U.S. position and as a potential deterent to maintaining that lead.

Concern that the present structure of Government is inadequate for addressing the panoply of information policy questions in a coherent fashion prompted Congressman George Brown to introduce H.R. 3137, the Information Science and Technology Act. The legislation reflects a belief on the part of some observers that information issues and problems are handled in a piecemeal fashion without adequate coordination between responsible Executive Branch agencies and without sufficient interaction with the private sector. In addition, H.R. 3137 suggests that information policies be given more priority attention and that they be handled at a higher level within the Government. In sum, Congressman Brown believes that without improvements in the ability to formulate information poli-

95-303 O—82——3

cies and direct related research activities, important opportunities afforded by these new technologies may be lost, negative impacts may be unavoidable, and the U.S. leadership position diminished.

Hearings held on H.R. 3137 confirmed the significance that information technology has for economic and social development. Likewise, the hearings reflected a general belief that information issues deserve increased attention by high ranking policymakers, the commitment of adequate resources, effective coordination among Government agencies, and input from the private sector. However, no consensus emerged on the best avenue to accomplish these goals. Although there was some sentiment for the establishment of new mechanisms for this purpose and a widespread belief that current efforts were not satisfactory, witnesses highlighted the difficulties in creating new entities in the current climate of budgetary constraints and many supported enhancing current operations as the most viable approach.

B. BACKGROUND

H.R. 3137, the National Information Science and Technology Act, was introduced on April 8, 1981, by Congressman George E. Brown, Jr. In introducing the bill, Mr. Brown asserted:

> Rapid advances in microelectronic and telecommunications technology, and the convergence of computers and telecommunications, have created new opportunities for economic growth, increased export markets, and gains in productivity, and will permit increased public access to all kinds of useful information. At the same time, these advances have important implications for the size and structure of the workforce, for the evolution of educational institutions, for personal privacy and civil liberties, and for many other concerns central to our personal and societal values. If we are to take advantage of the opportunities made possible by the new information technologies and minimize potential negative impacts, our social and governmental institutions must come to grips with the important policy questions raised by these scientific and technological developments.
>
> I am convinced...that Congress must move quickly to address some of the important concerns arising from the information revolution.

The Information Science and Technology Act was a revised version of a bill, H.R. 8395, introduced late in the 96th Congress by Representative Brown. No action was taken on H.R. 8395 in the 96th Congress.

C. SUMMARY OF H.R. 3137

The "Findings" section of the legislation declares the importance of microelectronics and telecommunications development for:

Scientific research;

The collection and dissemination of scientific and technical information;

Productivity in commerce, industry, government, and education; and

Increased exports.

International information issues are explicitly mentioned for their importance to the national economy and to foreign policy. The legislation further asserts that:

Federal research, development, and policy activities concerned with information are uncoordinated and fragmented throughout numerous agencies;

No comprehensive national effort has been undertaken to address the scientific, economic, and social issues arising from the rapid development of information technology and telecommunications, or to articulate national policies in the light of this development; and

No effective means currently exists to bring together public and private interests to discuss national information concerns in a cooperative fashion.

H.R. 3137 concludes that as a result:

The Nation's ability to exploit technological advances to achieve economic progress, to compete in world information markets, and to prepare citizens for participation in the information society is imperiled by the lack of a coordinated analysis of the implications of information technology.

The primary purposes of the Act are:

(1) To provide a forum for considering the information concerns of government, industry and commerce, educational interests, and the public; and

(2) To investigate and provide assessments of current and projected future developments in information science and technology, and of potential applications and their impacts, to serve as a basis for policy determination in information related issues.

Title I of the Act establishes, as an independent structure in the Executive Branch, an Institute for Information Policy and Research. The Institute would have a lifetime of ten years, unless extended by Congress.

The Institute would be governed by a 15-member National Information Science and Technology Board representing all functions involved in information generation and transfer, and administered by a Director. The Board would include members from the Federal Government, industry and commerce, and educational and professional organizations. It is charged with establishing a procedure whereby organizations and institutions involved in information policy issues may affiliate with the Institute.

The proposed Institute would conduct policy research and analysis, develop and recommend policy options, and propose goals and methods in support of policy development for scientific and technical research and development; dissemination of scientific and technical information; international information issues; and impacts of information technology on education and training needs and on the workforce. The Director of the Institute is given responsibility to insure close coordination between the Institute and other agencies, including the National Science Foundation and the Department of Commerce.

Title II of H.R. 3137 amends Title II of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (P.L. 94-282) by adding the position of Special Assistant for Information Technology and Science Information in the Office of Science and Technology Policy. The Special Assistant would be a member of the Board of the Institute. His responsibilities include coordinating the Institute's functions with other agencies of the Executive Branch

and assisting the Director of the Office of Science and Technology Policy (OSTP) in formulating policy on information technology and scientific information.

D. HEARINGS

On May 27, 28, and June 9, 1981, the Subcommittee on Science, Research and Technology of the House Committee on Science and Technology held hearings on H.R. 3137. The bill provided a central focus, but the hearings more broadly addressed the issues for both public and private sectors by the transition of American society to one dependent increasingly on information products and services.

The witnesses were asked to identify what they considered to be the key issues in this transition and what the approporiate Federal role should be in confronting these issues. They were also asked whether existing institutions were capable of addressing these issues adequately, whether the structural changes proposed in H.R. 3137 would improve this capability, and if there were other mechanisms better suited to this task. In his opening remarks, Subcommittee Chairman Doug Walgren expressed the hope that the witnesses' views: (p.1) [1]

> will enable the Subcommittee to develop a clearer concept of a constructive role for Congress and for the Federal Government in nurturing and managing our information resources.

Fourteen witnesses drawn from the Federal Government, industry and commerce, academia, the library community, and professional associations, were invited to testify. They were:

Dr. Marc Porat, Aspen Institute, and Consultant

Mr. Dale Hatfield, Acting Administrator, National Telecommunications and Information Administration

Dr. Eloise Clark, Assistant Director for Biological, Behavioral, and Social Sciences, National Science Foundation

Mr. Robert Willard, Vice President, Information Industry Association

Dr. Toni Carbo Bearman, Executive Director, National Commission on Libraries and Information Science

Dr. Thomas Galvin, Dean, School of Libraries and Information Science, University of Pittsburgh

Mr. Hubert Sauter, Administrator, Defense Technical Information Center

Dr. Stephen J. Lukasik, Chief Scientist, Federal Communications Commission

Col. Wayne Kay, Senior Policy Analyst, Office of Science and Technology Policy

Dr. Simon Ramo, Chairman of the Board, TRW-Fujitsu

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[1] All pages numbers refer to the published hearing record: U.S. Congress. House. Committee on Science and Technology. Subcommittee on Science, Research and Technology. H.R. 3137 - The Information Science and Technology Act. Hearings, 97th Congress, 1st session. May 27, 28 and June 9, 1981. Washington, U.S. Govt. Print. Off., 1981. 371 p.

Mr. Daniel Lacy, Senior Vice President, McGraw-Hill, Inc.

Mr. Dale Baker, Director, Chemical Abstracts Service

Dr. Dean Gillette, Executive Director, Corporate Studies Division, Bell Telephone Laboratories

Mr. Samuel B. Beatty, Executive Director, American Society for Information Science

II. The Information Society

A. TECHNOLOGICAL ADVANCES

Significant developments in computer and telecommunications technologies since the 1950's provide the underpinning of today's "information society." Most importantly, the merger of these technologies has resulted in a proliferation of new capabilities and services. In the field of data processing, advances have been made in a number of areas. New and improved memory devices, including videodiscs and bubble memories, supply substantially increased storage capacity. Less complex terminal equipment and improvements in software combine to allow easier access to and manipulation of computer systems. Most significantly, advances in microelectronics have brought dramatically increased computational capabilities at substantially lower costs. The National Science Foundation provided testimony which stated that, (p. 70)

> During the past 30 years, the linear dimension of electronic components have decreased by more than a thousandfold; their speed of operation has been multiplied by more than 60,000 their mean time before failure...[while] a computation which costs $1 today would have cost $28,000 in 1950.

Significant advances likewise have occurred in the field of telecommunications. Packet switching, for example breaks up digital messages into fixed length blocks which can travel independently through a network using the most efficient route and then be reassembled at the final destination. New techniques also contribute to more optimal use of the electromagnetic spectrum, while at the same time reducing costs, as in the case of communications satellites. "During the 15 years between Intelsat I and Intelsat V the capacity of a single communications satellite has increased by a factor of 50 and the cost per circuit-year has decreased by a factor of about 45." (p.70) Additional developments in microwave and cellular technologies, combined with advances in fiber optics offer opportunities for continued growth in a wide variety of telecommunications technologies.

Although these accomplishments in data processing and telecommunications are impressive in themselves, the real potential for advancement lies in the interaction between the two technologies. Computer-controlled electronic switches are now critical components of telecommunications networks and communications lines increasingly provide a key link between geographically distributed computer facilities. The merger of computers and telecommunications in a variety of combinations creates new and expanded capabilities which can be applied to a growing range of new services and systems. The emergence of electronic message systems, direct broadcast satellites, and numerous home information systems provide only a few examples of how these emerging technologies are being applied to the information transfer process.

B. THE ROLE OF INFORMATION IN THE ECONOMY

The consequences of this information revolution are felt on a number of levels as information plays an increasingly significant role in all aspects of human activity. The impact of modern computer and telecommunications technology may be seen on an international as well as national scale and affect social relationships as well as economics. As a result, the value of information as a vital national resource continues to grow and the tools developed to improve information transfer acquire additional worth.

1. Economic Stakes

It is difficult to provide a specific figure which reflects the total economic value of the wide range of information related products and services. No single category exists which fully defines the information sector of the economy, but indications of its importance may be seen by considering a number of relevant industry statistics. Among the major contributors to this aggregate are enterprises engaged in producing equipment and services in the fields of electronics, telecommunications and data processing. In addition, publishers, broadcasters, and a variety of other "information providers" may be included in any estimate of the information industries' contribution to the economy.

The National Telecommunications and Information Administration (NTIA), acknowledging the difficulty of providing a complete assessment, submitted some indicators of the worth of several portions of this market. Among the figures provided were: (pp. 52-59)

> The computer service industry in the United States, consisting of 8,000 companies, produced $13.5 billion in revenues in 1979.
>
> Publishers of books and journals generated $6.3 billion in revenues.
>
> Total spending on information processing products, services, and supplies should [be] $62 billion in 1981.
>
> The world market [for telecommunications equipment] will grow from an estimated $40 billion in 1980 to about $87.5 billion (constant 1979 dollars) by the end of this decade.
>
> The U.S. computer industry is expected to maintain high growth rates...[and] shipments will increase 26.2 percent from $26 billion in 1980 t0 $32.8 billion in 1981.
>
> Total exports of information merchandise broadly defined amounted to...$24.3 billion in 1980.
>
> In 1979 total U.S. factory sales of electronic products were $80.6 billion.

Other witnesses provided additional evidence of the substantial role that information industries play in U.S. economic growth. The Information Industry Association estimated that "U.S. information companies represented [in 1979 about 150 companies which offer information services] about $10 billion in worldwide revenues." (p. 80) In terms of the U.S. workforce, the figures are equally impres-

sive. Dr. Marc Porat of the Aspen Institute stated that "more than fifty million Americans now earn their livelihood by dealing primarily with information goods and services..." (p.8) and noted that, "the Federal Government itself...employs the largest single group of information workers." (p. 5) There was general agreement among all witnesses that these trends could be expected to continue with new developments in computer and telecommunications technologies and the expanding service oriented workforce.

Indeed, one of the most significant aspects of "information industries" is their critical role in supporting the service sector. Services now account for more than 60% of gross national product in the United States and constitute an important element of U.S. exports. These industries, such as banking and insurance, rely heavily on telecommunications and information equipment and services to function effectively and provide products. In addition, as U.S. enterprises increasingly compete in international markets their need for effective telecommunications and data processing services for strategic planning and efficient operations grows. As one witness stated, "Efficiency in the information handling is not only important to one of our major industries itself, but important to our efficiency in...all our other industries in carrying on their activities." (p. 243)

2. Future Importance of Information Technology for Society

As significant as information activities are for the growth of the U.S. economy, the long range social impacts emenating from the employment of modern information technology are equally compelling. The National Science Foundation's Information Activities Task Force Report highlighted the enormous consequences of the information age when it described this "quiet revolution": (p.69)

> It is quiet because the signs of change are not always visible. It is a revolution because nothing of comparable significance has happened since the invention of writing and printing. It is destined to change the way information and knowledge is made available to people all over the world.

The effects of computer and telecommunications technologies on the workplace, on entertainment, on home and community life, and on lifestyles generally is only beginning to be understood. While the pace of developments in these fields continues at a rapid rate, the application of new techniques within institutions and by individuals is a slower process. As a result, the various ramifications of the transition to an information age are not yet totally evident. What is clear, however, is that this shift is a fundamental transformation with far reaching consequences. As Dr. Simon Ramo testified: (p.196):

> The complete nationwide installing of the emerging, innovative electronic information technology wherevever it would pay off economically would call for a trillion dollars of investment. So we are speaking of a technology with gigantic economic implications. But the economics is the smallest part of the story.
>
> The humanistic aspects of extending and replacing human brainpower by machine, the accompanying social-political dilemmas, the problems of articulation of choices and difficulties in decisionmaking among them, and the arranging of sound government-private relationships are as challenging as any in the whole history of technology-society interactions.

3. Foreign Competition

The United States is the world leader in computer and telecommunications technologies. In recent years, however, U.S. industries are being challenged by our major trading partners, including Japan, Canada, and Western Europe, in a number of areas. While in some cases competition has resulted from foreign advancements in particular technologies, there are other underlying factors which concern policymakers in both the public and private sectors. As Congressman Brown noted, "It is our failure to recognize the need to coherently advance our capabilities in dealing with this widespread range of issues, which is at the root, in all probability, of our failure to retain competitiveness in many vital areas." (pp.97-98)

The United States is being challenged on numerous fronts. Semiconductors produced by the Japanese are capturing a growing share of that important market, while European database producers increase in numbers. In addition, Dr. Samuel Beatty testified that "during the past several years a number of U.S. information industry organizations have been acquired by or merged into foreign firms. Included are Predicasts, Bibliographic Retrieval Services, Aspens Systems, Auerbach Publishers, and Congressional Information Services." (p. 309)

Numerous witnesses noted the need for Government to reassess its relationship to the information industries. Some called for increased funding for research and development and improved tax incentives. Others noted the need for reduced government regulation and the development of a coherent and consistent strategy to counter foreign competition to U.S. enterprises. Dr. Dean Gillette of Bell Telephone Laboratories provided several illustrations of U.S. leadership in telecommunications and computer technology and stated that he believes the competitive problem lies not with the development of new technologies, but in the "introduction of new techniques for increased productivity and introduction of services for use by the public." (p.273) In his view, "what we need from government is encouragement in completing the innovation process, in bringing these new information technologies which we have pioneered into widespread national service." (p.273)

Another perspective was provided by Dr. Toni Bearman of the National Commission on Libraries and Information Service who indicated that U.S. leadership in this field has begun to erode in part because of steps being taken by other nations. For example: (pp.103-4)

> The European Economic Community has been funding database development, providing 25-50 percent of startup costs for new data bases. It has also funded a large study on how to market European information products and services in North America, employing U.S. consultants as expert subcontractors.

Although witnesses offered varying rationales for what they saw as increased competition from abroad, there was general agreement among both the private and public sector witnesses that the United States can no longer afford to rest on its past accomplishments if this Nation hopes to retain its dominant position worldwide and expand into new markets.

C. INFORMATION POLICIES OF FOREIGN GOVERNMENTS

In recent years several nations, both developed and developing, have articulated national information policies and taken steps to foster the growth of indigenous computer and telecommunications industries. These actions reflect the growing recognition internationally of the value of information and related technologies for economic growth and social progress. At the same time, they also represent efforts to protect against potentially adverse effects of the technology, such as the loss of individual privacy.

Unlike the United States, telecommunications and data processing industries are often government owned or supported in foreign nations. In addition, policymaking may be centralized and economic strategies developed on a national scale. Witnesses cited a variety of actions currently being taken by foreign governments which reflect these approaches to developing national information policy. In some cases, long range studies have been performed to analyze the impact of the information age and recommend policies for harnessing modern computer and telecommunications technologies for society. As Congressman Brown stated in his opening remarks: (p.2)

> In countries around the world, including our major trading partners Japan and Western Europe, governments have been quick to recognize the economic and social challenges posed by the information revolution. They have responded with active programs not only to enhance their competitive positions in international trade, but also to train citizens to use the technology constructively...

As examples of this several witnesses referenced national papers outlining comprehensive strategies for the development of information resources and industries and addressing the societal impact of these technologies. Among these significant studies are the French *L'informatisation de la Societe* (The Computerization of Society), the Canadian *Telecommunications and Canada* , the British *Information Technology* , and the Japanese *MITI Vision for the Eighties*.

A number of other actions by foreign governments indicate the efforts being taken in support of their information industries. Testimony by Mr. Samuel Beatty of the American Society for Information Science provided several such cases: (p.308-9)

> For example, the recently announced Japanese federal government budget carries funding for three major research and development programs as an ambitious effort to focus business and government resources on the drive for world leadership in the rapidly developing computer industry.
>
> The French Industry Minister has recently announced a 21% increase in funding for information technology to bring the total expected expenditures for 1981 to nearly $140 million.

III. U.S. Government Framework for Information Policy

A. NATURE OF INFORMATION POLICY

Information issues are receiving increased attention today, but the concept of information policy formulation remains somewhat vague. In part, this is a reflection of the inherently interdisciplinary nature of information policy and the fact that it often closely integrated with ongoing activities within the Government. The fact that information plays an increasingly important role in the economic, social, and political arenas likewise magnifies the diffiulties in isolating what might be termed purely information policy. Moreover, as information technologies continue to develop and new services come into widespread use, new and often complex questions of public policy emerge.

1. Unique Characteristics

It is difficult to precisely set the parameters of information policy because information plays such a pervasive role in human activity today. Unlike other natural resources which often are diminished with use, information may take on greater value as it is manipulated and further disseminated. In some instances, information policies are perceived in the context of specific applications. From another perspective, information policies are based on fundamental democratic principles. Several witnesses provided their points of view on how information policy may be delineated.

According to Mr. Dale Hatfield, Acting Director of NTIA: (p.25),

> Broadly speaking, information policy concerns the conditions of information availability. It has long been clear that the widespread availability and dissemination of information is critical to American society. The first amendment to the Constitution recognizes the fact that Government restrictions on the expression of ideas and the dissemination of those ideas - that is, of free speech and free press respectively - are so dangerous that they should be proscribed.

Dr. Eloise Clark of the National Science Foundation provided another concept of information policy by describing the wide spectrum of issues which may be included in this term. She stated that: (p.68)

> If we take information policy in its broad meaning, it may encompass things ranging from technical standards in telecommunications protocols for packet switching, to broad value questions of public access to information networks. Such questions are different from the promotion of the use of information technologies by a particular group for conducting research. Both activities differ as well from the generic area of scientific and technical information exchange.

Another viewpoint of what constitutes information policy was provided by Mr. Robert Williard of the Information Industry Association. He stated that there is a "dichotomy between information content and the conduit that happens to be used to carry that information" (p.83), and such a distinction should be applied in the development of public policy. He commented that "too often public

institutions approach information policy in terms of the medium of expression, transfer or storage, rather than focusing on the essence of what is being expressed, transferred, or stored." (p.83)

The difficulties in formulating information policies are compounded by the rapid development of modern technology. Several witnesses referenced the fact that computer and telecommunications technologies are merging and thus blurring traditional definitions. The result is that issues which were often dealt with distinctly and in different ways no longer can be addressed in the same manner. The ability to make policies which reflect the unique nature and value of information as well as recognize the pace of technological advancements becomes an increasingly complex undertaking.

2. Pervasiveness of Information Policies

As was stated in Section II, the U.S. Government is the largest employer of information workers and data collector. Dr. Bearman of the National Commission on Libraries and Information Science testified that "recent estimates indicate that the U.S. Government currently has approximately 10,000 data bases." (p.103) Thus, decisions affecting the gathering, analysis, and dissemination of information are being made in virtually every agency of the Federal Government.

In some ways, these activities are a reflection of the significant role of information in carrying out Government functions. In addition, it is symptomatic of the decentralized character of the American system of Government. As Congressman Brown commented: (p.2)

> The U.S. approach to the challenges of the information revolution has been more decentralized and less coordinated, with responsibilities fragmented among a number of agencies. Our faith in the invisible hand to evolve correct and timely responses to information issues seems almost limitless.

There was a general consensus throughout the hearing that because of the nature of information policy, it would be extremely difficult, and according to several witnesses undesirable, to completely centralize information policymaking. Dr. Simon Ramo highlighted this point: (p.197)

> Here it is certainly not easy to imagine any single Government organization's being both systems philosopher and overall decision implementor on each and every front that information technology touches. Numerous present Government agencies are going to have to remain in the act because their functions, from studies to decisions, cannot be extracted and lumped into one agency.

The concerns of witnesses centered on questions of coordination, resources, high level attention, and development of strategies, rather than on the precise location of authority. There was an overall recognition that the various players in the Federal Government contributed unique perspectives and expertise which are critical to sound decisionmaking. Some witnesses stated strongly that the creation of any type of information "czar" was anathema to the United States' system of government and failed to take account of the important role of the private sector in information policy formulation. According to Dr. Stephen Lukasik of the Federal Communications Commission: (p. 182-183)

"...the notion of generating ideas to solve problems or to make selections among various solutions that are offered, to coordinate those activities between the public and private sector, is a very complex process and it does not lend itself to the creation of any single point that encompasses everything – especially in the area of information, which includes a very wide range of publishing activities, broadcasting activities, private services, common carriers, and the like."

This point was reitterated by several witnesses, including Dr. Bearman of the National Commission on Libraries and Information Science, as the following statement indicates: (p. 116)

I think having seperate but interacting groups, such as the National Commission, NTIA, and the Department of Education, State Department, and the Department of Commerce, for example is necessary. These groups have very different types of expertise; they express very different concerns; and some of them respresent different constituencies.

B. KEY PLAYERS IN FEDERAL INFORMATION POLICYMAKING

Information issues are addressed in virtually every agency and department of the Federal Government. The efficient conduct of internal agency operations requires the collection, analysis, and dissemination of relevant data. In addition, modern technology plays an increasing part in traditional information handling activities. For example, electronic funds transfers are now an integral part of the Federal Reserve System and electronic mail systems are employed by the U.S. Postal Services. In another area, U.S. representation at international meetings concerned with information questions is overseen by the Department of State, while problems in international trade in information goods and services are addressed by the Office of the United States Trade Representative, in the Executive of the President. National security restrictions on the dissemination of technical information are reviewed by the Department of Defense, among others.

However, several players have key responsibilities for formulating and coordinating government information policies. Among these are the Congress, the National Telecommunications and Information Administration (NTIA) of the Department of Commerce, the Federal Communications Commission (FCC), and the Executive Office of the President (EOP), including the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP).

1. Congress

Congress plays a central role in formulating information policy. Through the legislative, oversight, and appropriations functions, Congress influences a wide range of information policies and activities. The scope of information-related issues addressed by Congress is reflected in a broad array of statutes and diversity of committees. Aside from such major information laws as the Privacy Protection Act of 1974 and the Paperwork Reduction Act of 1980, each Congress passes numerous measures containing provisions which affect a wide variety of information collection and dissemination activities. In addition, numerous oversight hearings are conducted each session on telecommunications and information policies and programs.

Despite what appears to be a hightened interest by Congress, several witnessess commented on Congress' need to focus more attention on information policy questions and improve coordination among the variety of committees which address these issues. As stated by Mr. Robert Willard: (p.84)

> The principal agency empowered to establish information policy is the Congress of the United States. The Congress, however is not organized to give information policies the attention they deserve. These responsibilities are fragmented just as they are within the executive agencies.

The patchwork of congressional committees involved in information policy was acknowledged by Chairman Walgren in his opening remarks when he stated that: (p.1)

> The development and application of communications and information technologies has generated a number of difficult questions for policymakers, many of them extending well beyond the jurisdiction of the Science and Technology Committee, or of any single committee.
>
> This subcommittee's efforts should be viewed as one piece of an elaborate mosaic. We are aware of, and ready to cooperate with, the activities of other subcommittees and committees in working toward common goals.

2. National Telecommunications and Information Administration (NTIA)

A focal point of Federal information policy is the National Telecommunications and Information Administration of the Department of Commerce. Created by Executive Order 12046 in 1978, "NTIA has had the lead within the executive branch in dealing with telecommunications/information policy. This stems from NTIA's responsibility to examine the policy implications of the convergence of computer and telecommunications technologies." (p.25)

NTIA's activities range across a broad array of information and telecommunications areas. Among the topics which have received priority attention are: "whether telephone companies should be prohibited from providing certain new information services electronically"; "cable television retransmission"; "information privacy concerns involving certain private sector records-keeping activities"; "the Government's role as a provider of electronic funds transfer services and electronic message services"; and "transborder data flows of personal and other information." (pp. 26-27) Mr. Dale Hatfield, Acting Director of NTIA, emphasized that this agency plays a critical role in supporting the policymaking process by analyzing these key issues in a timely manner.

While there was little criticism of the quality of NTIA's work, several witnesses expressed concern about NTIA's limited resources and its location within the Department of Commerce. Mr. Robert Willard of the Information Industry Association noted two problems related to NTIA's position in the Department of Commerce. He stated that "the presence of NTIA in any large department adds one more time consuming layer of bureaucracy." (p.82) He added: (p.83)

> More troublesome, though, is the ability of NTIA structurally to deal objectively with information policy issues within its own department. Commerce houses a lot of governmental activities that focus on information: Census, Patent and Trademark, NOAA, Bureau of Standards, NTIS, and many others.

How can NTIA offer an impartial critical policy analysis of these information activities that would not be subject to the usual bureaucratic innuendo and infighting that bubbles below the surface in a large organization?

In response to further expressions that NTIA operates "at a fairly low level in the Department" by Congressman Brown, Mr. Hatfield stated that "I don't feel it is as important where the organization is located as is the commitment to get things done." (p.42)

3. Federal Communications Commission (FCC)

The FCC has the primary responsibilty in the Federal Government for regulating interstate and foreign communications by radio, wire and cable. Dr. Stephen Lukasik outlined four basic areas of information technology in which the FCC is involved. These include: (p. 173)

1. Common carrier tariffs (47 U.S.C. 203).
2. Common carrier facility authorization (47 U.S.C. 214).
3. Radio spectrum allocation (47 U.S.C. 303(c)).
4. Technical standards for radio systems (47 U.S.C. 303(e)).

The role of the FCC is important because it often affects the pace at which new telecommunications services are made available and under what conditions. Among the current proceedings which have particular significance for the growth of information technology are those dealing with technical standards for teletext systems, allocation of spectrum for interim direct broadcast satellites (DBS), and the implementation of Computer Inquiry II which alters the ways the telecommunications industry is regulated. The FCC also is involved actively in representing U.S. interests at meetings of international organizations, such as the International Telecommunications Union (ITU).

The FCC, however, is unique among the other executive branch entities because it is an independent regulatory agency whose decisions are not subject to approval by the President. At present, the regulatory framework of the telecommunications industry is in a period of transition as a result of the Computer Inquiry II decision and the American Telegraph and Telephone/Department of Justice antitrust settlement. The role of the FCC is also receiving attention in the current debate in Congress surrounding the revision of the Communications Act of 1934. In the 97th Congress, legislation has passed the Senate (S.898) and was considered by the House Committee on Energy and Commerce.

4. Executive Office of the President (EOP)

Within the Executive Office of the President, two entities have mandated authorities for the development of information policy: the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP).

a. Office of Management and Budget (OMB).

OMB has taken on an increased role in this area since the passage of the Paperwork Reduction Act of 1980 (P.L. 96-511) and the establishment of the Office of Information and Regulatory Affairs. The Act alters report requirement procedures and Federal paperwork management, requires uniform and consistent information practices, and provides for improved coordination and integration

of Federal information practices. In addition, OMB issues a variety of directives affecting information activities, such as the dissemination of scientific and technical information and government provision of information services. In some instances, witnesses expressed the hope that OMB's enhanced mandate would improve coordination of government information policies, but others were more skeptical. Dr. Thomas Galvin, representing the American Library Association (ALA) stated that "ALA remains concerned about the concentration of authority in OMB to set Federal information management policy without a publicly accountable oversight body." (p.125)

b. Office of Science and Technology Policy (OSTP)

When OSTP was created in 1976, (P.L. 94-282) it was given the responsibility to "survey the need for increased effectiveness of information handling systems for science and technology, including working with the private sector." (p.185) Colonel Wayne Kay of OSTP provided several examples of OSTP's efforts to address scientific and technical information questions. He specifically highlighted the work of the Ad Hoc Committee on Science and Technical Information Policy which was created in December 1978 and operates within the framework of the Federal Coordinating Council for Science, Engineering and Technology (FCCSET). Colonel Kay stated that the Committee identified five areas for attention, including: (p.186)

First, the role of central Government supported clearinghouses, particular the National Technical Information Service (NTIS) and Smithsonian Science Information Exchange (SSIE);

Second, relations of Government with the private sector;

Third, accessibility and pricing policies;

Fourth, role of Federal National Libraries;

Fifth, status of research on information technology.

He concluded that OSTP, by studying these issues and coordinating with OMB, has "been active in dealing with this matter and that progress albeit slowly is being made in sorting out and confronting the problems." (p.88) Colonel Kay's assessment of OSTP's accomplishments was not shared by other witnesses. Mr. Dale Baker, Director of Chemical Abstracts Service, made the following comment: (p. 233)

Congress most recently assigned information policy responsibility to the Office of Science and Technology Policy, which stated publicly its intent not to act, but to assign the responsibility to the National Science Foundation. NSF has not acted. What had been the strongest agency leader for 15 years (1960-75) in information matters became one of the weakest.

IV. Major Information Policy Questions

The hearings highlighted the broad spectrum of issues which may be categorized as "information policy." The varying perspectives of witnesses reflected the diversity of interests and agencies involved in the debate on information policy. In addition, the interdisciplinary nature of information policy and research clearly emerged. Topics discussed ranged from the role of the Federal Government in information research and development to regulatory issues; to questions of equitable access to information.

Several items received priority attention by witnesses, including international information concerns and the dissemination of scientific and technical information. Underlying much of the testimony were recurrent calls for coordination within the Federal Government and clarification of public and private relationships in the information sphere. Witnesses representing virtually every element of the information policy debate echoed these two themes throughout the hearings.

A. INTERNATIONAL ISSUES

As discussed in Section II. B. 3. foreign competition to the U.S. information industry is increasing and focusing attention on international information policymaking. In addition to the problem of U.S. competitiveness witnesses addressed a number of other international issues. Included in these were: (p.292)

> ...whether or not the United States should be open in its sale abroad of scientific information, how intellectual property rights in computer programs and software transmitted across national boundaries can be protected, and how the foreign trade position of our domestic information industry can be enhanced by Federal Government policies.

Of special concern to several witnesses was the question of access to scientific and technical information by foreign governments. The United States traditionally supports the principle of free flow of information worldwide. In recent years, the United States has responded to attempts to censor journalists, increase government control over information, and erect barriers to data transmission by defending this fundamental belief in uninhibited information flows. While not opposing these concepts, some observers have expressed concern that the openness of the American system allows foreign nations to acquire technical information which may be used to this Nation's economic or strategic disadvantage.

According to Mr. Hubert Sauter of the Defense Technical Information Center: (p. 143)

> Unfortunately in this country, public release and foreign release are very nearly synonymous. U.S. fronts for foreign companies and even unfriendly intelligence operations have easy access to much of our technical information. I believe we must attempt to address and solve this problem.

In response to questions concerning the restriction of technical information, Dr. Toni Bearman related the findings of the Department of Commerce Technical Advisory Board. She stated that: (p.120)

...we finally decided that we could not really distinguish between scientific and technological information. First of all, the two are so interwoven. And second, by starting to restrict information given away we are setting very dangerous precedents which do go against our whole attitude of a free nation.

Another area noted by witnesses was the lack of coordination among the several executive branch agencies responsible for international information policies. A significant number of international meetings are scheduled over the next few years at which information and telecommunications issues will be addressed. Included are meetings sponsored by the International Telecommunications Union, the Organization for Economic Cooperation and Development, and the United Nations, including UNESCO. Witnesses raised questions regarding the ability of the U.S. Government to adequately represent this Nation's interests internationally due to the fragmentation of authority and lack of resources. Mr. Samuel Beatty, speaking for the American Society for Information Science (ASIS) stated that: (p.292)

Information science on an international level still falls between the cracks. It is impossible to tell who speaks for the United States on information policy matters. Even modest attempts to maintain an international voice are threatened, as exemplified by the recent decision of the National Science Foundation to discontinue its funding, through the National Academy of Sciences, of U.S. participation in the International Documentation Federation.

B. COORDINATION AND DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION

The importance of scientific and technical information (STI) for supporting advancements in research and development has long been recognized. During the last 20 years numerous reports by both Government and the private sector examined the role of scientific and technical information and addressed related public policy issues. Despite these efforts, however, several witnesses highlighted the need to focus on STI programs to prevent their erosion.

Mr. Hubert Sauter, Administrator of the Defense Technical Information Center, one of the major U.S. Government STI activities, outlined what he saw as the Government's role in this area. (p.141)

First, and I think foremost, Federal departments or agencies must establish or utilize systems to collect, control, and disseminate that scientific and technical information which is necessary for them to accomplish their own programs and missions...

The second role...is that Federal agencies must work with and exchange scientific and technical information with other Government agencies to insure the maximum Federal return on the research and development that has been made by these agencies...

A third role...is the role of the Federal Government in the dissemination to the maximum extent possible, which can be useful to the general public.

Another Government entity closely involved with scientific and technical issues is the Office of Science and Technology Policy (OSTP). As stated in Section III. B. OSTP has addressed several STI topics through the Federal Coordinating Council for Science, Engi-

neering, and Technology (FCCSET). One focal point of these efforts was central clearinghouses for STI within the Federal Government, such as the National Technical Information Service (NTIA). According to Colonel Wayne Kay of OSTP: (p.186)

> In our view, strong cental clearinghouses are integral to arresting the continuing proliferation of information services within agencies. Proliferation often stems from statutory provisions that an agency create a clearinghouse in a specified area. Proliferation of fragmented collections of information deters use of new information technology that can handle masses of information.

While Colonel Kay was concerned about the growing number of information activities within Federal agencies, other witnesses criticized recent budget cuts and policy directives which may limit dissemination of STI. Recognizing that coordination remains a substantial problem in many instances, several witnesses pointed to other side effects of reduced funding for information programs and activities. Dr. Thomas Galvin commented that: (pp.124-125)

> Unfortunately, information dissemination activities are often the first to be cut when budgets must be trimmed...However, a democratic government has an obligation to make available its information collection activities, and its research and development efforts.

This perception was repeated by Dr. Toni Bearman who stated that "we must be very careful not to diminish the responsibility of the Federal Government to disseminate and to diffuse information paid for through Government funds. There is a growing concern that in our concern to reduce paperwork, we may start limiting the distribution of information." (p.105)

A related aspect of the information dissemination question is the role of public libraries. Libraries may provide an important service by assuring access to information in a highly technological society where expensive equipment and specialized expertise may not be available to all citizens, thereby preventing "a society polarized into two groups, the information rich and the information poor." (p.124) Although public libraries provide a major point for information dissemination activities, according to Dr. Thomas Galvin they are sometimes overlooked in the policy formulation process. He recounted one relevant case in 1978 where the Office of Management and Budget proposed a new policy for dissemination of STI which "would have been in direct conflict with" the depository library distribution requirements of Title 44 of the *U.S. Code*. As Dr. Galvin noted, "there is a danger that these separate policies may develop in isolation and not be coordinated with each other." (p.124)

C. PUBLIC AND PRIVATE SECTOR INTERACTION

The issue raised most often during the hearings was the interrelationship between the public and private sector. Some of the key questions raised included: What is the appropriate role of the Federal Government in information policy? In what areas should the private sector take the lead? Where should the Federal Government provide support for information research and development? At what funding levels? What information services should the Federal Government provide? Which are more appropriate for private enterprise? How can the Federal Government promote increased

productivity through the use of information technology? Who should be responsible for ensuring that adequate numbers of information professionals are trained? At what point should the Federal Government become involved in the information marketplace, if at all? How can adequate legal and regulatory frameworks be established?

Resolution of this problem area poses particular difficulties due to the nature of the U.S. information industry and the U.S. economy in general. There was an overwhelming consensus that the strength and leadership of the United States in information technology reflects the vitality and diversity of private enterprise. Private initiative and competitiveness were viewed as key contributors to the U.S. dominance in this field. At the same time, the role of the Federal Government was seen as vital in sustaining this achievement and in assuring a positive transition to an information society.

Information policy questions are perceived differently in the United States as compared to other nations where national governments play the lead (and sometimes the only) role in information and telecommunications policymaking. The important contribution of commercial and not-for-profit enterprises combined with the predeliction for the Government to defer to the marketplace in information activities requires a unique approach to policy development in the United States. How effective cooperation between the two sectors may be established was a major point of discussion throughout the hearings. As stated by Dr. Simon Ramo, "...the interfaces are so many and so influential that surely the interrelationship of Government to private endeavors constitutes both the key and the limit to progress." (p. 199)

Dr. Ramo went on to outline what he saw as part of the problem in delineating public and private sector roles: (p.227)

> In this country, we are inclined to push two opposing, extreme views, neither getting us very far...One view is that the free market made America great, so the route to success in information technology is for the Government to stay out of it. That, it is claimed, will insure superiority for the United States and our fullest use of this technology. That is an extreme view, and I think it is wrong. The other equally wrong view is that you can't trust the selfish profit-seeking non-objective private sector with this field of such great importance to the Nation. Instead you must have total control by the Government. That is also wrong. Both the Government and the private sector are needed.

Although there was general agreement that the Government plays a major role, there were difference of opinion regarding where the line should be drawn. Dr. Marc Porat presented one popular perspective when he stated that, "I do not think the Government ought to intervene unless there is a clear and present reason why it should..." (p. 5) However, he was quick to add that "on the other hand, the Federal Government itself, as an entity, is an enormous actor in the information age." (p.5)

Dr. Simon Ramo provided another useful description of the Government's role, saying that it should act "as a competent, active referee. Without the Government's creation of an environment of clarity as to what can or cannot be done in the private sector, we will have a Tower of Babel in communications." (p.229)

There was little disagreement that the Government should be involved in efforts requiring large investments and high risks, as

well as those which related to specialized Government activities, such as national security. There was less agreement, however, surrounding the Government's role as a provider of information. As indicated by Mr. Samuel Beatty, "the dividing line is difficult to define" in these instances. Specifically, he questioned: (p.295)

> Who should pay for information?
>
> How can proprietary rights to information be defined?
>
> Who owns information produced with public funds?
>
> How much should people pay for information?
>
> How is information piracy prevented?
>
> To what extent should Government be involved in information dissemination?

Several witnesses specifically addressed the issue of Government competition with the private sector. The Federal Government is a major producer and distributor of information, as well as a substantial consumer of information products. While it is the stated policy of the U.S. Government to rely on the private sector to satisfy information needs as much as possible, conflicts continue to arise. The result, according to Mr. Dale Baker, Director of Chemical Abstracts, is that:

> "...all too often we [private sector] find ourselves talking about the Government as a competitor and a threat. That unfortunate and undesirable situation could be corrected if issues at the public and private interface could be addressed at the level of principle rather than of procurement and in an atmosphere of mutual respect rather than of confrontation." (p.235)

Other witnesses highlighted individual areas where the role of the Federal Government may require clarification. One such issue is research and development funding. Dr. Eloise Clark of the National Science Foundation outlined their program objectives for research and development in information science. She stated that "as the primary source for investigator-initiated university-based research, we have a major responsibility to maintain the strength of academic research in these areas." (p.67)

Dr. Dean Gillette, Executive Director, Corporate Studies Division, Bell Laboratories reflected the view of many in the private sector when he said that "the Government role is to support research and development in areas that are socially desirable but not economically attractive." (p.266) He also stated his belief that while information policy research might prove beneficial in some areas, it would only serve "to delay congressional action on other essential information policy issues in hopes of better insights from further research." (p.265)

This view was not shared by all witnesses. Mr. Samuel Beatty suggested that: (p. 293)

> Within the Federal Government there is a need for greater emphasis on and coordination of R & D in information science, as it reflects societal values and affects Federal policymaking. Such research activities are not receiving support from existing Federal programs.

He produced further evidence of this lack of commitment by stating that "information policy per se received only one-half of one percent of the total $56 million" spent by Government agencies on library and information science research between 1970-1979. (p. 294)

Related to the issue of research and development is support for education and training of information professionals. Again witnesses agreed that this is an area where Government, industry, and academia will have to work cooperatively to satisfy the need for qualified engineers, computer scientists, and information specialists. As Dr. Thomas Galvin of the University of Pittsburgh strongly stated: (p. 123)

> Let me put the matter squarely: unless Government, industry and education join forces quickly to mount a large-scale attack on the information manpower problem, America's competitive edge in the world information marketplace will be lost.

Regulatory and legal structures provided a final area of discussion concerning the Government and private sector relationship. Although reliance on the dynamics of the marketplace was stressed by all witnesses, the importance of the Government for setting ground rules and insuring equity also was recognized. Dr. Dean Gillette of Bell Laboratories cited "regulatory delay" as a problem in the introduction of new technologies for public use. (p.264)

However, other witnesses acknowledged the important regulatory role that Government plays in the information arena. As stated by Mr. Daniel Lacy of McGraw-Hill: (pp.244-245)

> Some regulation is indispensable. Somebody has to allocate the electromagnetic spectrum and say which TV station can use which channel...someone has to represent the United States in negotiations abroad. Somebody has to sustain the educational system that trains electrical engineers and computer experts, and so on. But even in those aspects of the problem that can be left to the free operation of the marketplace, we have to recognize that by far the largest participant in the marketplace is the Federal Government.

The Government likewise plays a significant part in maintaining adequate incentives for private enterprise. This was emphasized by Dr. Gillette who advocated "the need for industry incentives" and "aggressive congressional action in authorizing more rapid depreciation." (pp. 263-264)

Mr. Dale Hatfield of NTIA provided further thoughts on areas where Government action may be required to insure fair competition in the marketplace. Specifically he cited basic laws and regulations affecting intellectual property, such as copyright, patents, and trade which may require adjustments in light of technological advances. He concluded that "laws structure the marketplace for information goods and services, and if we do not keep our laws abreast of our technology further developments and competition may suffer." (p.28)

V. H.R. 3137. The Information Science and Technology Act of 1981: Pros and Cons

A. CONCEPT OF AN INSTITUTE FOR INFORMATION POLICY AND RESEARCH

Congressman George Brown outlined the basic components of information policy development when he introduced H.R. 3137. Specifically, he stated that three ingredients were required: (p.3)

> First, a better understanding of the potential impacts and limitations of information technology; second, the joint development by the public and private sectors of guidelines to translate this understanding into a consensus for future action; and third, a mechanism with the authority and resources to refine and implement the policy guidelines thus arrived at.

The concept of an Institute for Information Policy and Research as outlined in H.R. 3137 (see Section I.B.) was developed as a means for accomplishing these objectives.

Throughout the course of the hearings witnesses reittereated the need for effective coordination within the Federal Government, higher level attention to information policy matters, increased resources, and improved interaction between public and private sectors. Reactions to the proposed Institute as a mechanism for addressing these problems ranged from strong support; to general agreement on the concept, but not the form; to opposition. In some instances witnesses favored the approach suggested by the Institute, but found it not to be viable in an era of budgetary constraints and reductions in the size of Government. In other cases, the specific institutional arrangement was not supported.

There was general agreement among most private sector witnesses that the Government needed to pay increased attention to the development of information policies and coherent strategies, but not necessarily through the creation of a new entity. On the other side, representatives of Executive Branch agencies asserted that many of the existing programs and policies functioned satisfactorily and did not support any legislation which might transfer existing authorities for information policy. These witnesses agreed with the general goals of the legislation, but suggested that the proposed Institute would not prove successful in achieving its intended purpose. As a result, although no consensus was reached on the best institutional approach to developing of national information policies, the hearings focused attention on major issues of concern and provided an opportunity for input from all sectors.

B. NEED FOR NEW INSTITUTIONAL ARRANGEMENTS FOR INFORMATION POLICYMAKING

Numerous witnesses commented on the need to improve a number of aspects of information policy formulation. Although witnesses opposed the creation of any monolithic information apparatus, they repeatedly stated that the current situation is less than

satisfactory and many supported the need for an effective coordinating entity. In the words of Dr. Marc Porat, "At present there exists no coherent mechanism for assembling the collective insights of the different branches of Government on questions of information policy...There is nothing new in that statement, but, on the other hand, there has been little improvement." (p.6)

Mr. Dale Baker concurred in this opinion when he reflected on a speech he delivered in 1974: (p.235)

> The United States does not need a centrally operated or directed national information system...our decentralized, pluralistic system gives our science and technology the most effective service available anywhere in the world. But all of our services, government, commercial, and "not-for-profit," need a platform on which they can communicate among themselves as equals in attacking problems of mutual concern.
>
> To be most effective that platform should have standing in the Executive Branch of Government. It should have the strength to apply leverage to achieve consistency of goals, policies, and practices among Government information programs and between Government and non-Government programs. It should promote cooperation and coordination at all levels.

Mr. Baker added further that "the need for such an institute or a forum is more urgent and vitally more important now than ever before in the history of our country." (p. 235)

Other witnesses pointed to the role which an Institute might play in fostering information research and analysis, coordinating policy related activities, providing an independent perspective on issues of national importance, supporting long-range planning, improving coordination and dissemination of scientific and technical information, and serving as a useful forum for public-private interaction. Mr. Robert Willard of the Information Industry Association, in outlining its support for H.R. 3137, described the Institute's advantages as follows: (p. 100)

> Essentially, the Institute serves as a focal point, as a single place that–let's say acts as a magnet to attract individuals who are concerned with information policy...Looking at the purposes of the structure, the institute develops the policy. It does not actually implement it. It does not write the laws. It does not issue the regulations. But it looks at it in an independent manner without having to worry about whether the secretary of the department will concur or whether another agency within the department will concur.

As indicated above, several witnesses agreed with the importance of improving existing Government organization for information policy, but found the approach of an Institute to have certain limitations. For example, Dr. Simon Ramo concurred that "the present structure of the Federal Government is not adequate for performing the necessary Government roles," but he went on, to "suggest that the bill's proposed structure is not in itself adequate and that it may not necessarily be the best way to obtain a maximum degree of improvement." (p. 197)

Another witness who supported the concept behind the legislation, but suggested that it might be difficult to implement was Mr. Daniel Lacy. In his prepared statement he asserted that: (pp. 255-256)

> What is needed is a means of achieving an overview and arriving at concerted policies, under which each agency can then carry out its assigned responsibility in the light of a common strategy. The Institute proposed in this bill may be one effective means of pulling together all the agencies and private sector groups involved to develop such an overview, such policies and such a strategy...

But one has to contemplate the possibility -- indeed perhaps the probability -- that in this time of financial stringency it may not be practical to create a new Federal agency, even one as modestly funded and staffed as the proposed Institute.

Furthermore, Mr. Lacy offered his opinion that "I do not believe that sort of strategic leadership can be achieved by the legislative imposition of any particular administrative structure." (p.257)

C. SUPPORT FOR EXISTING INSTITUTIONAL ARRANGEMENTS

Opposition to the creation of the Institute focused on several key elements. One was that existing institutional arrangements were workable--if not always functioning at their potential. Another centered on a concern about removing information policy functions from operational settings within the responsible agencies. A third dealt with the proposed scope of the Institute.

Mr. Dale Hatfield of NTIA provided the Administration's position on H.R. 3137. He stated that: (p.28)

Let me emphasize that we share the view of the sponsors of this legislation concerning the importance of information policy. Virtually all of the desirable objectives and shared goals of this proposed legislation can be achieved, however, and indeed are being pursued within the framework of existing laws and organizations. The administration, accordingly, does not support this proposal. We do not believe moreover, that this proposal would substantially advance the goal of providing good policy research and analysis in support of policy decisions. Indeed, by separating policy research from the policymaking, the proposal could adversely affect forward progress in this area.

Other representatives of the Executive Branch echoed the Administration's view. Mr. Hubert Sauter said that "the Department of Defense supports the intent of this bill. However, we feel that the Institute for Information Policy and Research with a source of policy guidance in the new and independent National Information Science and Technology Board is also unnecessary." (p.144) Finally, the Office of Science and Technology Policy in the Executive Office of the President offered the following recommendation: (p. 185)

Rather than create a new institute to replough old ground, we believe that this administration is in a position to deal with the already explored issues by reviewing the existing recommendations, pragmatically adding or deleting where necessary, and by using the mechanisms already in being.

A second concern regarding the location of information policy research was noted by Dr. Gillette of Bell Labs. He suggested that, "separation of information policy research groups from mission orientation within existing agencies could reduce the effectiveness of the effort." (p.265) This opinion was not shared by all witnesses. Mr Robert Willard of the Information Industry Association stated that "we feel neither the institute nor the special assistant that the bill establishes have the power to set information policy, and we endorse that approach." (p. 84)

Several witnesses raised a final problem concerning the scope of the Institute. Recognizing the difficulties of establishing parameters for information policy and research actvities, concerns were raised that "the net has been thrown rather widely." (p. 168) As Dr. Stephen Lukasik went on to explain: (p. 168)

One alternative is to study policy analysis and to formulate policy options. Another possibility is as a coordinator of the research and analysis activities of others. A third is as a disseminator of ideas. A fourth is as a reviewer of the policy activities of others. Still another is a forum for the interaction of diverse groups.

The bill mentions all of these. But it is important, I think, to recognize at the outset that there are incompatabilities among those functions.

VI. Alternatives for Action

Witnesses offered a variety of suggestions for enhancing the information policy process. In some instances, the concept of an independent Institute was endorsed, although with modifications. In other cases, the witnesses favored improving the existing structure rather than formulating a new one. Finally, several witnesses proposed alternative approaches including special commissions or committees in the private sector and at different locations within the Government.

A. IMPROVE EXISTING STRUCTURE

Several witnesses indicated a strong belief that the current problems were not structural in nature, but stemmed instead from a lack of effective coordination, adequate resources, and high level attention. From this perspective, improvements could be made, but would have to come from within the Executive Branch rather than being imposed from without. In other words, adequate authorities for developing information policies exist, but a greater attempt to employ these authorities coherently may be needed. As stated by Dr. Stephen Lukasik, "we have a number of policy formulation and policy coordination mechanisms. One should let those mechanisms continue to operate." (p. 183) Dr. Lukasik added in response to further questioning, however, that "an increase in level of activities would be in order." (p. 183)

Dr. Toni Bearman similarly pointed to the need to address information policies more effectively within the existing framework. She commented that: (pp. 105-106)

> My personal opinion is that we have many existing mechanisms which should be capable of filling those roles adequately, but these roles have not been filled. It is not a different structure that is needed, but rather more emphasis must be given to the important information issues confronting us and more attention must be paid to dealing with these issues.

The need for effective coordination of existing policies and programs was noted also by Dr. Eloise Clark of the National Science Foundation. She suggested that "the alternative of integrating the efforts of existing agencies toward the solution of specific problems on a case by case basis may be preferable to the establishment of a separate Institute." (p.69)

Other witnesses suggested that additional authorities may need to be allocated to existing players in information policymaking as a means for increasing attention to this area. Dr. Simon Ramo provided two specific suggestions along these lines; an expanded Federal Communications Commission and enhanced White House activities. As Dr. Ramo proposed: (p.198)

> One Government unit within the executive branch could be assigned much although far from all of the leadership for understanding, sponsoring, and controlling applications of information technology. We could house in a broadened FCC, for in-

stance, those of the Government functions that it is indeed possible to separate from other units without great dislocation.

Emphasizing that the White House ultimately plays a major role in final policy determination, Dr. Ramo described another alternative in which the White House could undertake greater responsibility in addressing information technology issues. He offered that "it is a reasonable suggestion then that a single White House office could study all important systems problems involving science and technology with inputs from expertise in many locations in Government, academia, and technology industry. That single White House organization for interdisciplinary, technology related analysis could include the existing OSTP." (p. 198)

B. ESTABLISHMENT OF AN INSTITUTE

Several witnesses supported the creation of an Institute along the lines proposed in H.R. 3137. Mr. Robert Willard of the Information Industry Association stated that the legislation "will provide for a mechanism for addressing a large range of information policy issues." (p. 84) In addition, he highlighted the value of the Institute for providing decisionmakers in both Congress and the Executive Branch with improved access to expertise on information issues.

One of the strongest proponents of the legislation was the American Society for Information Science (ASIS). Mr. Samuel Beatty, Executive Director of ASIS, discussed in depth the benefits which might accrue from an Institute for Information Policy and Research. He asserted that "the executive branch agencies were basically mission oriented, had too narrow a perspective, and had potential problems with regulatory aspects." (p. 296) At the same time, Mr. Beatty suggested that the legislative branch "normally work[s] on a one-time or ad hoc basis..." (p. 296) Mr. Beatty concluded that "the formation of a high level, jointly supported Institute, adequately supported by Government, for profit, [and] not-for-profit, would maintain a necessary focus on the overall information transfer process." (p.296)

C. ALTERNATIVE PROPOSALS

Several other proposals designed to achieve the objectives sought by H.R. 3137 emerged during the hearings. Dr. Marc Porat focussed on the importance of involving the private sector in the creation of any new information policy entity. Noting that private industry has already begun to address major information issues, Dr. Porat suggested "some kind of partnership between government and business, largely funded by business, to take on these same questions..." (p. 7) In addition, he noted the fact that foundations are committing funds to the study of information technology issues and suggested that the not-for-profit sector could provide an additional source of expertise for policymakers. In essence, Dr. Porat recommended that the functions of the Institute might be accomplished through a joint public-private sector enterprise in which the private sector, rather than the Government takes the lead.

Mr. Daniel Lacy proposed two other alternatives for improving the development of information policy. "One would be to provide for the creation of a temporary broadly representative Presidential

Commission with a two-year life charged with the responsibility of collecting information, studying the issues, and presenting a report with policy and action recommendations." (p. 256) He further suggested that: (p. 256)

> perhaps a better idea might be to create a temporary Select Joint Committee of Congress, made up of the majority and minority leadership of the various committees concerned, with the responsibility for causing studies to be made...for holding hearings, and within a specified time for presenting a report recommending national policies.

Mr. Lacy acknowledged that these approaches had limitations as well, but expressed the belief shared by many witnesses that "a successful course of action by the Government in this whole complex field, as the proposed Bill makes clear, absolutely requires a coherent strategic view." (p. 257)

APPENDIX

97TH CONGRESS
1ST SESSION

H. R. 3137

To maintain and enhance the United States' leadership in information science and technology by establishing an Institute for Information Policy and Research to address national information policy issues; to provide a forum for the interaction of government, industry and commerce, and educational interests in the formulation of national information policy options; to provide a focus and mechanism for planning and coordinating Federal research and development activities related to information science and technology; and to amend the National Science and Technology Policy, Organization, and Priorities Act of 1976 to create a new position of Special Assistant for Information Technology and Science Information.

IN THE HOUSE OF REPRESENTATIVES

APRIL 8, 1981

Mr. BROWN of California introduced the following bill; which was referred to the Committee on Science and Technology

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A BILL

To maintain and enhance the United States' leadership in information science and technology by establishing an Institute for Information Policy and Research to address national information policy issues; to provide a forum for the interaction of government, industry and commerce, and educational interests in the formulation of national information policy options; to provide a focus and mechanism for planning and coordinating Federal research and development activities related to information science and technology; and to amend

the National Science and Technology Policy, Organization, and Priorities Act of 1976 to create a new position of Special Assistant for Information Technology and Science Information.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Information Science and Technology Act of 1981".

FINDINGS

SEC. 2. The Congress finds and declares that—

(1) advances in microelectronics and telecommunications have created opportunities for greater productivity, more efficient use of energy, increased exports, and access by individuals and institutions to a great diversity of information and educational resources;

(2) the conduct of scientific research and development activities would be benefited by wider availability of powerful computing facilities for modeling and simulation and by improved access to relevant and timely information;

(3) new developments in information systems afford an opportunity for the efficient collection, storage, retrieval, and dissemination of scientific and technical information, which is critical to public and private efforts to apply new knowledge;

(4) the use of information technology in instruction and training and in job performance increases the productive capacity of commerce, industry, government, and educational institutions;

(5) international information issues, including transborder data flows and increased foreign competition in the sale of information products and services, have important implications for foreign policy and national economic well-being;

(6) Federal research, development, and policy activities concerned with information are uncoordinated and fragmented throughout numerous agencies, and current efforts toward resolving information issues are limited by the inability to consider the overall impacts on the many sectors involved;

(7) no comprehensive national effort has been undertaken to address the scientific, economic, and social issues arising from the rapid development of information technology and telecommunications, or to articulate national policies in the light of this development;

(8) information services provided by the private sector constitute an important and rapidly expanding part of the information community, yet no effective means currently exists to bring together public and pri-

vate interests to discuss national information concerns in a cooperative forum; and

(9) the Nation's ability to exploit technological advances to achieve economic progress, to compete in world information markets, and to prepare citizens for participation in the information society is imperiled by the lack of a coordinated analysis of the implications of information technology.

PURPOSE

SEC. 3. It is the purpose of this Act—

(1) to promote and facilitate the conduct of scientific research and development through the use of modern information technologies;

(2) to provide a forum for considering the information concerns of government, industry and commerce, educational interests, and the public;

(3) to investigate and provide assessments of current and projected future developments in information science and technology, and of potential applications and their impacts, to serve as a basis for policy determination in information-related issues; and

(4) to conduct and manage studies and analysis in information science and technology in support of the objectives described in paragraphs (1), (2), and (3).

DEFINITIONS

SEC. 4. As used in this Act—

(1) the term "Institute" means the Institute for Information Policy and Research established by section 101(a);

(2) the term "Board" means the National Information Science and Technology Board established by section 101(b)(1);

(3) the term "Director" means the Director of the Institute for Information Policy and Research, as provided for in section 101(b)(2);

(4) the term "information science" means the knowledge of how information in any form is organized and transferred; and

(5) the term "information technology" means the tools used to collect, process, store, retrieve, and transmit data and information, including in particular both the hardware and software of computer-based systems.

TITLE I—INSTITUTE FOR INFORMATION POLICY AND RESEARCH

ESTABLISHMENT OF THE INSTITUTE

SEC. 101. (a) There is hereby established in the executive branch of the Federal Government an Institute for Information Policy and Research.

(b) There are hereby established in the Institute—

(1) a National Information Science and Technology Board, to function in accordance with section 105; and

(2) an Office of the Director of the Institute, to function in accordance with section 106.

(c) The Institute shall be administered by the Board in accordance with existing Federal laws.

(d) In addition to the Director, the Institute shall have such other officers and employees as the Board may determine to be necessary or appropriate.

AFFILIATION WITH THE INSTITUTE

SEC. 102. The Board shall establish a procedure whereby organizations and institutions with a significant interest in information issues may affiliate themselves with the Institute, under such conditions as the Board may determine under section 105.

TERMINATION OF THE INSTITUTE

SEC. 103. The Institute shall terminate its existence ten years after the date of the enactment of this Act, unless Congress shall extend its lifetime for an additional five years. In making a determination to extend its lifetime, Congress shall take into account the following criteria:

(1) the extent to which the Institute has taken advantage of the substantial body of knowledge already

available which addresses information policy and research issues;

(2) the ability of the Institute to coordinate and interact with other Federal agencies concerned with information policy and research and to distinguish policy and research issues of overall national import from those which are a proper function of mission-related agencies;

(3) the extent to which the Institute's programs have been responsive to the views and concerns of the information community; and

(4) the extent to which the functions of the Institute may be successfully integrated into existing institutions of the executive branch.

FUNCTIONS OF THE INSTITUTE

SEC. 104. The Institute is authorized and directed—

(1) to collect, assess, and make available to the Federal Government, and to Institute affiliates, data and information not otherwise available about developments and trends in information science and technology throughout the world, including the efforts of foreign governments to develop and articulate national information policies;

(2) to conduct studies and make recommendations for the preparation of citizens to benefit from the abili-

ty of information technology to organize and provide access to large collections of information, and for promoting equity of opportunity for such access;

(3) to conduct and support research into the broad policy issues concerning human interaction with, and acceptance of, information technology in the home, school, and workplace;

(4) to examine potential impacts of information technology on the size, structure, and training needs of the work force, and to access the consequences of such impacts;

(5) to analyze potential impacts of regulatory policies and of patent and copyright policies on the development of new technology configurations, and to propose policy options responsive to new or novel applications of information technology and telecommunications;

(6) to identify areas of overall national importance in future technical research and development, including in particular large-scale computing needs for scientific research, to coordinate development plans involving the participation of the Federal Government, and to perform such fundamental studies and research as may be required to establish the institutional structure needed for such development;

(7) to conduct research into and analyses of current and potential international information policy issues, including economic aspects of transborder data flows, access by foreign governments and corporations to United States-generated information, and the creation of international information systems to address the information and communications needs of less-developed countries;

(8) to develop and assess policy options for improving the dissemination of scientific and technical information (STI), with particular attention to (A) coordination of STI activities among agencies and identification of institutional barriers to improved STI flows, (B) integration of data bases and elimination of unnecessary duplication through increased networking capabilities, and (C) improvements in the dissemination of STI generated within the Federal Government or under grants to or contracts with the Federal Government;

(9) to conduct studies and propose specific goals, policies, and methods for the Federal Government's use of information technology to improve overall administrative effectiveness and to reduce costs through improved productivity;

(10) to develop channels of communication and promote extensive interaction between the Institute

and appropriate governmental, educational, scientific, industrial, commercial, and other private entities, in order to promote innovation, develop more efficient processes of dissemination and utilization of STI, and provide a public policy forum for informed citizen involvement in information issues; and

(11) to serve, to the extent practicable, as a model for the use of information technology, by exemplifying in its organization and function the employment of this technology to enhance efficiency and to promote personal satisfaction and self-fulfillment.

NATIONAL INFORMATION SCIENCE AND TECHNOLOGY BOARD

SEC. 105. (a) The Institute shall be operated under the general supervision and policy control of a National Information Science and Technology Board, which shall consist of fifteen members to be appointed by the President and of the Director ex officio.

(b) The persons appointed to the Board—

(1) shall be eminent in the fields of information science and technology, social and economic impacts of information technology, the classification and dissemination of information, education, technology assessment, science and technology policy, and public affairs; and

(2) shall be selected solely on the basis of established records of distinguished service.

(c) The persons appointed to the Board shall include the Special Assistant for Information Technology and Science Information of the Office of Science and Technology Policy as provided in title II of this Act; the Director of the Office of Federal Information Policy in the Office of Management and Budget; and the chairman of the National Commission of Libraries and Information Science. The Board membership shall at all times include representatives of private sector businesses providing information products or services or trade associations comprised of such businesses; of scientific or professional associations; and of educational institutions or associations thereof. The Board membership shall actively represent the variety of different functions involved in information processing and transfer, such as—

(1) the creation of information;

(2) the development and marketing of technology for collecting, storing, transmitting, and receiving information;

(3) provision of access to information via information technology; and

(4) consumption of information provided via information technology.

(d) The President shall designate one member of the Board as chairperson and one member as vice chairperson for a term of office not to exceed five years. The vice chairperson shall perform the duties of the chairperson in the latter's absence. In case a vacancy occurs in the chairpersonship or vice chairpersonship, the Board shall elect a member to fill such vacancy.

(e) The term of office of each member of the Board shall be five years, except that (1) any member elected to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be elected for the remainder of such term; and (2) the terms of office of the four members first taking office under each of the first three numbered paragraphs in subsection (c) shall expire, as designated at the time of their appointment, one at the end of three years, one at the end of four years, and two at the end of five years. No member shall be eligible to serve in excess of two consecutive terms of five years each.

(f) The Board shall meet no less often than once every three months at the call of the chairperson, or upon the written request of one-third of the members. A majority of the voting members of the Board shall constitute a quorum.

(g) Members of the Board who are not in the regular full-time employ of the United States may receive compensation when engaged in the business of the Institute at a rate

fixed by the chairperson but not exceeding the daily equivalent of the rate provided for level GS–18 of the General Schedule under section 5332 of title 5, United States Code, and shall be allowed travel expenses as authorized by section 5703 of title 5, United States Code.

(h) The Board members shall act as quickly as possible to adopt bylaws governing the admissions of organizations and institutions to affiliation with the Institute, as provided in section 102. The Board shall have the power to approve affiliation, to establish a fee structure, and to create such classes of affiliation with such rights, powers, privileges, and limitations as the Board, in its sole discretion, shall deem to be in the best interest of the Institute.

(i) The Board shall, in addition to any powers and functions otherwise granted to it by this Act—

(1) establish the policies of the Institute, in accordance with applicable policies established by the President and the Congress;

(2) review the budget of the Institute;

(3) review the programs of the Institute;

(4) submit an annual report to the President, for transmission to the Congress, describing past, current, and proposed activities of the Institute;

(5) submit biannually to the President for transmission to the Congress, beginning with the third year

of the Institute's existence, a five-year outlook on public policy issues concerning information and the application of information technology in both the public and private sectors; and

(6) approve or disapprove every grant, contract, or other funding arrangement the Institute proposes to make, except that a grant, contract, or other funding arrangement involving a commitment of less than $200,000 may be made by the Director without specific Board action, if the Board has previously reviewed and approved the program of which that commitment is a part.

(j) The Board is authorized to appoint a staff consisting of not more than three professional staff members and such clerical staff members as may be necessary. The professional staff members may be appointed without regard to the provisions of title 5, United States Code, governing appointments in the competitive service and the provisions of chapter 51 of such title relating to classification, and may be compensated at a rate not to exceed the rate provided for level GS–18 of the General Schedule under section 5332 of such title.

(k) The Board is authorized to establish such special commissions as it may from time to time deem necessary for the purposes of this Act.

(l) Board members shall be appointed not later than ninety days after the date of the enactment of this Act.

DIRECTOR OF THE INSTITUTE

SEC. 106. (a) The Director of the Institute shall be appointed by the President, by and with the advice and consent of the Senate. Before any person is appointed as Director, the President shall afford the Board an opportunity to make recommendations with respect to such appointment. The Director shall receive basic pay at the rate provided for level II of the Executive Schedule under section 5313 of title 5, United States Code, and shall serve for a term of five years unless removed by the President.

(b) Except as otherwise specifically provided in this Act, the Director shall exercise all of the authority granted to the Institute by this Act.

(c) The Director may make such provisions as he deems appropriate authorizing the performance by any other officer, agency, or employee of the Institute of any of his functions under this Act.

(d) The Director shall formulate the programs and budgets of the Institute, in consultation with the Board and taking due consideration of the concerns of the affiliates. As a basis for the selection and conduct of the Institute's programs, the Director shall prepare, for the approval of the Board, a short-range plan of activities and a long-range plan of activities.

Each plan shall as fully as possible prioritize the full range of information policy and research activities appropriate to the Institute. Such plans shall be prepared within one year after the initial selection of the Director, and each such plan shall be updated annually.

GENERAL AUTHORITY OF THE INSTITUTE

SEC. 107. (a) The Institute shall have the authority, within the limits of available appropriations, as to all things necessary to carry out the provisions of this Act, including but not limited to the authority—

(1) to establish additional offices and other organizational structures within the Institute;

(2) to prescribe such rules and regulations as it deems necessary governing the manner of its operations and its organization and personnel;

(3) to make such expenditures as may be necessary for administering the provisions of this Act;

(4) to enter into grants, contracts, cooperative agreements, or other arrangements with whatever persons, organizations, countries, or other entities are deemed most useful by the Institute to accomplish the purpose of this Act;

(5) to acquire, hold, or sell real and personal property of all kinds necessary to carry out the purpose of this Act;

(6) to receive and use funds and property donated by others, if such funds and property may be used in furtherance of the purposes of this Act;

(7) to accept and utilize the services of voluntary and uncompensated personnel, and provide transportation and subsistence as authorized by section 5703 of title 5, United States Code, for persons serving without compensation;

(8) to arrange with and reimburse other Federal agencies for any activity which the Institute is authorized to conduct;

(9) to receive funds from other Federal agencies for any activity which the Institute or any such other agency is authorized to conduct; and

(10) to appoint and fix the compensation of personnel necessary to carry out the provisions of this Act.

(b) Except as provided otherwise in this Act, appointments under subsection (a)(10) shall be made in accordance with the provisions of chapter 51 and subchapter III of chapter 53 of title 5, United States Code; but the Director may, in accordance with such policies as the Board shall prescribe, employ technical and professional personnel and fix their compensation, without regard to such provisions, as he deems necessary to carry out the purpose of this Act.

TRANSFER OF FUNCTIONS

SEC. 108. (a) There are hereby transferred to the Institute—

(1) the Office of Policy Analysis and Development of the National Telecommunications and Information Administration; and

(2) any programs specifically concerned with information technology and its impacts in the Division of Policy Research and Analysis of the National Science Foundation.

(b) The President may in addition transfer to and vest in the Institute, under and in accordance with schedules, procedures, and standards prescribed by the Director of the Office of Management and Budget in regulations—

(1) any or all information or information science and technology-related policy research and analysis being conducted or administered within the Federal Government by agencies other than the Institute, in cases where the goals of such research and analysis transcend individual agency missions;

(2) all functions, powers, and duties of any officer or employee of the United States which relate primarily to programs or activities transferred under paragraph (1); and

(3) so much of the positions, personnel, assets, liabilities, contracts, property, records, and unexpended balances of appropriations, allocations, and other funds employed, held, used, arising from or available for the programs, activities, functions, powers, and duties transferred under paragraphs (1) and (2) as may be determined under such regulations to be appropriate. Personnel engaged in the performance of functions, powers, and duties transferred under this subsection shall be transferred in accordance with applicable laws and regulations relating to transfer of functions.

(b) With respect to any function, power, or duty transferred under subsection (a) and exercised by the Institute after the date on which this section takes effect, reference in any Federal law to the agency or officer from which the transfer is made shall be deemed to be a reference to the Institute or the Board.

COORDINATION OF PROGRAMS

SEC. 109. (a) The Director shall insure that all programs of the Institute are coordinated with other programs of the Federal Government.

(b) To the greatest extent possible, extramural basic research which the Institute wishes to support shall be supported through National Science Foundation programs through transfers of funds to the Science Foundation.

(c) To the greatest extent possible, technical studies related to communications networks, systems standards and protocols, and security of data transmission which the Institute wishes to support shall be conducted by the Institute for Computer Science and Technology of the National Bureau of Standards and by the Institute for Telecommunication Sciences of the National Telecommunications and Information Administration, through transfers of funds to the Department of Commerce.

(d) The Institute is authorized and directed to provide assistance to the Office of Science and Technology Policy upon request.

AUTHORIZATION OF APPROPRIATIONS

SEC. 110. (a) There are hereby authorized to be appropriated to the Institute—

(1) $6,000,000 for the fiscal year 1983;

(2) $8,000,000 for the fiscal year 1984; and

(3) $10,000,000 for the fiscal year 1985.

(b) Funds appropriated pursuant to subsection (a) shall be in addition to any funds provided from fees paid by the affiliates of the Institute or from additional fees paid for particular research projects.

TITLE II—SPECIAL ASSISTANT FOR INFORMATION TECHNOLOGY AND SCIENCE INFORMATION

SEC. 201. Title II of the National Science and Technology Policy, Organization, and Priorities Act of 1976 is amended by adding at the end thereof the following new section:

"SPECIAL ASSISTANT FOR INFORMATION TECHNOLOGY AND SCIENCE INFORMATION

"SEC. 210. (a) The President shall appoint, by and with the advice and consent of the Senate, a Special Assistant for Information Technology and Science Information, who shall be responsible to the Director of the Office of Science and Technology Policy.

"(b) The primary function of the Special Assistant for Information Technology and Science Information shall be to assist the Director in formulating policy and providing advice within the executive branch on scientific and technical information and the technologies involved in its collection, processing, and dissemination. In so doing the Special Assistant shall—

"(1) provide close liaison between the Executive Office of the President and the Institute for Information Policy and Research;

"(2) provide assistance to the Office of Management and Budget with an annual review and analysis of funding proposed for research and development in information science and technology and the dissemination of scientific and technical information in budgets of all Federal agencies, and provide assistance to the Office of Management and Budget and the agencies throughout the budget development process;

"(3) establish a suitable mechanism to coordinate the activities of the Institute for Information Policy and Research with those of executive branch agencies having significant responsibilities for research, development, and application of information science and technology, including, but not limited to the Department of Defense, the Department of Energy, the National Science Foundation, the National Bureau of Standards, the National Aeronautics and Space Administration, the National Telecommunications and Information Administration, the National Technical Information Service, the Department of Education, the Department of State, and the Federal Communications Commission;

"(4) investigate the feasibility and desirability of a coordinated Federal information locator system for scientific and technical information generated within the

Federal Government or under grant to or contract with the Federal Government;

"(5) make recommendations to the President for improving dissemination of scientific and technical information both within the United States and internationally, and for better coordinating scientific and technical information activities among agencies of the executive branch; and

"(6) make recommendations to the President concerning the goals and directions of federally-supported research and development in information science and technology, and concerning appropriate institutional mechanisms for fostering such research and development.".

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